



Architect with Balanced Technology Extended (BTX) for Better Routing, Thermals, and Structural Support

Greg Schlechter
Senior Technical Marketing Engineer
Desktop Products Group
Intel Corporation

Overview

"There is no reason anyone would want a computer in their home" (Ken Olson, president, chairman and founder of DEC). The author of this quote from 1977 could not have been more wrong. Today, desktop computers are used everywhere from the home to offices, libraries, and Internet cafes. Both consumers and corporations are demanding a wider variety of uses, applications, and form factors for their PCs. With this growing demand, desktop developers need a flexible set of building blocks to take advantage of the opportunities that these new usages present.

Balanced Technology Extended (BTX) is a new interface specification that provides common, flexible building blocks based on standards that can be used to build innovative desktop systems. Today's systems need to incorporate the latest performance technologies, yet still meet increasing thermal, power, structural, acoustic, and electromagnetic compatibility (EMC) requirements. The BTX specification provides new tools and design space for developers to layout desktop systems. And BTX offers this for PCs that range in size from small, compact systems down to 6L in volume, to very large, expandable systems.

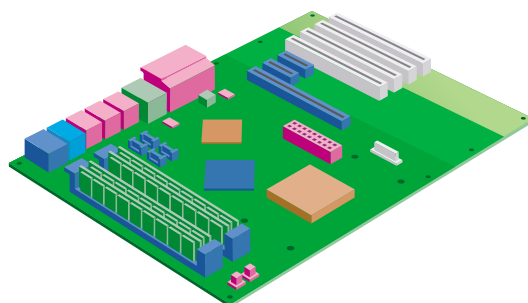


Figure 1. BTX handles a variety of motherboard features and system sizes

Balanced Technology Extended

BTX is the new desktop form factor on the block. The specification helps address many of the design challenges facing today's developers, such as balancing size, performance, features, and cost. The specification also helps developers extend the useful life of industry designs across products and over time. Finally, BTX supports the implementation of a variety of innovative and high-performance technologies for desktop platforms.

BTX offers many key advantages for developers including:

- Low-profile options for motherboard component keep-out. The lower profiles make it easy to integrate options into slim-line or small form-factor systems.
- Optimized routing, layout, and thermal advantages with an inline core layout. The new layout offers a condensed system design and optimized airflow path for efficient system cooling. It also helps developers avoid obstructed airflow that must be forced around components, and helps provide adequate cooling to all components. Along with optimized airflow, the use of high-quality fans can allow developers to eliminate one or more fans from the system, which can reduce the acoustics and system size even further.
- Scalable board dimensions. Flexibility in board sizes allows developers to use the same components to design a variety of system sizes and configurations. A smaller, more efficient power supply can be used for ultra-small systems. Standard ATX 12V power supplies can be used for tower configurations.
- Optimized structural board-support mechanisms and mounting holes. The support features offer mechanical characteristics to support high loads—such as heavy heat sinks—and help keep them from flexing or damaging board components and traces during shipping and handling.

With all these advantages, BTX is the form factor, not just for today's PCs, but for the systems of tomorrow.

PC Form Factors

The term “form factor” is used in the computer industry in various ways. The term is often used to refer to the overall size and shape of the system. It can also refer to the size and shape of the standard components that can be easily procured, yet which still allow developers to mix and match ingredients to create a large range of system types and sizes. Such standardization lets developers differentiate a product line to fit the many usage models in today's PC industry.

Most developers are familiar with the ATX and microATX motherboard form factors that are used in the majority of PCs today. These form factors describe the size of a motherboard, board-component height restriction zones, and mounting holes—elements that interface with the chassis and power supply. For example, a microATX form-factor motherboard is a motherboard that complies with the microATX form factor specification. A microATX form-factor motherboard can be integrated into a 10 L chassis (microATX-size) or a 30 L chassis (ATX-size). The form-factor (motherboard) for a 10 L, 20 L, or 30 L chassis can be the same, while the system configuration for each PC can be different.

The BTX specification helps standardize the same common, mechanical interface described above for ATX and microATX. One difference is the fact that the BTX specification was designed to encompass a family of board sizes for a range of system sizes. It's like having ATX, microATX, and FlexATX form factors all in one specification, but BTX can span an even wider range of system sizes with a common core board layout.

BTX offers even greater flexibility than ATX and microATX by supporting not only different board sizes, but also different system heights. There are two heights defined in the BTX specification for developers to use in their designs. The

standard height is similar to the height defined in the ATX-family form factor. An additional, lower profile height is defined for use where it is important to reduce the overall size of the system.

Summary

The BTX specification offers developers a building-block approach for using today's components in systems from 6 L in volume up to standard desktop tower sizes. In addition, the BTX specification gives developers opportunities to improve thermals, acoustics, motherboard routing, and structural support. BTX is also optimized for the newest desktop technologies, such as PCI Express* and Serial ATA.

Developers can now download and review the specification, then begin working with their customers to review today's system tradeoffs and the new options available with BTX.

More Info

The Balanced Technology Extended (BTX) Motherboard Interface Specification Revision 1.0 is available online at the formfactors.org Web site (<http://www.formfactors.org>).

Author Bio

Greg Schlechter is a senior technical marketing engineer in the Desktop Products Group at Intel Corporation. After working for several years in the design of Intel® platform ingredients, Greg now focuses working with the PC industry on various industry form-factor initiatives and standards. He holds a B.S. in industrial and manufacturing engineering from Oregon State University.

Intel Access

This article can be found online at
Technology@Intel Magazine Home Page

Desktop Form Factors Web site

Intel® Desktop Board Home Page

Developer Web Site

Intel Literature Center

General Information Hotline

<http://developer.intel.com/update/departments/desktop/dt10031.pdf>

<http://www.formfactors.org>

<http://developer.intel.com/design/motherbd>

<http://developer.intel.com>

<http://developer.intel.com/design/litcentr>

(800) 548-4725 7 am–7 pm CST (USA and Canada)

International locations please contact your local sales office.

(800) 628-8686 or (916) 356-3104 5 am–5 pm PST

For more information, visit the Intel Web site at: developer.intel.com

UNITED STATES AND CANADA

Intel Corporation
Robert Noyce Bldg.
2200 Mission College Blvd.
P.O. Box 58119
Santa Clara, CA 95052-8119
USA

EUROPE

Intel Corporation (UK) Ltd.
Pipers Way
Swindon
Wiltshire SN3 1RJ
UK

ASIA-PACIFIC

Intel Semiconductor Ltd.
32/F Two Pacific Place
88 Queensway, Central
Hong Kong, SAR

JAPAN

Intel Japan (Tsukuba HQ)
5-6
Tokodai Tsukuba-shi
300-2635 Ibaraki-ken
Japan

SOUTH AMERICA

Intel Semicondutores do Brasil LTDA
Av. Dr. Chucris Zaidan, 940-10º andar
04583-904 São Paulo, SP
Brazil

Intel may make changes to specifications and product descriptions at any time, without notice.

*Other names and brands may be claimed as the property of others.

Intel and the Intel logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Information in this document is provided in connection with Intel® products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty, relating to sale and/or use of Intel products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, life-saving, or life-sustaining applications. Intel may make changes to specifications and product descriptions at any time, without notice.

